from bottom to top. It reminded him of the wonderful ice-polished precipice on the left bank of the Aar glacier, above the Grimsel. It was clear, therefore, that not only was this second cañon old; it was older than the glacial period; it had supplied a channel for the glacier that ground its way out from the mountains. Endeavouring to estimate the minimum thickness of the ice, he traced with the eye the glaciated surfaces up to the summit of the declivity—a height of at least 800, perhaps 1,000 feet,—and they evidently went still higher. In going further up the valley, he found that the blocks of granite and gneiss, dropped by the glacier as it melted, went far above 1000 feet. He got them on the shoulders of one of the great hills overlooking the valley 1,600 or 1700 feet above the plain. The ice, therefore, must have been not less than 1,600 or 1,700 feet thick, and must have passed across intervening ridges into adjacent valleys. It thus appeared that not only did glaciers occupy the valleys of this region, but that some of them were of such thickness as to deserve the name of ice-sheets, covering the whole surrounding region.

Leaving the Yellowstone Valley, the party struck through the forest, and after a two days' ride reached the Upper Fire-Hole Basin of the now famous geyser region. Prof. Geikie gave a general sketch of the aspect of this district, and described the operations of one or two of the geysers which he witnessed. After the long ride through an arid region and dusty wastes, he tried hard here to get a pool to wash in, but could find nothing below 212°, and the only chance of getting a warm bath was to find some hole where the water had had time to cool after flowing out of the hot crater. The whole ground was honey-combed with holes, each filled with gurgling boiling water. One geyser, affectionately and gratefully known as "Old Faithful," went off with wonderful regularity every 63 minutes; the others were more capricious. The singular depositions round the orifices of eruption and round the margins of the pools on the cones were referred to, and among other interesting phenomena an account was given of the "Devil's Paint Pot," a mud geyser, throwing out white and brilliantly-coloured mud, boiling like a great vat of rather thick pasty porridge, and surrounded with small mud cones, each of which had formerly been a point of emission.

In quitting the Yellowstone region, it was impossible not to reflect with admiration upon the labours of the explorers who had first made known the wonders of this remote and inaccessible region. The Reports of Hayden and his associates were found to be most trustworthy and useful. Nor could one forget the sagacity with which Hayden proposed, and the enlightened liberality with which Congress enacted, that for all time the Yellowstone Region should be a tract set apart as a national park for the instruction and recreation of the people.

On the way out of the mountains by Henry's Lake and the head of the Snake River branch of the Columbia River, the travellers came upon a party of armed Indians, who explained that they were out of their reservation on their way to a council of Indians in Montana. As the great outbreak of the White River Utes, who killed Major Thornburgh and his men, took place only about ten days or so later, and as there was then some excitement among the tribes to the West, the geologists, though pleased at the time to have seen the noble red man in his war-paint among his native wilds, came to think that on the whole they might congratulate themselves on having seen no more of him. Only last year the Yellowstone country was dangerous from roving bands of Indians, several lives having been lost in it. Leaving the Indians, who pursued their northward course in a bee-line, the travellers held westward along the edge of the vast basalt plateau of the Snake River—one of the most extensive lava fields in the world. A great plain, thousands of square miles in extent, had there been deluged with dark basalt. No cones or eminences appeared from which the lava migh have been poured. Perhaps the eruptions took place from open fissures. Here and there later cones had risen upon the plain, belonging, doubtless, to some of the later stages of the volcanic activity. Some of these cones still retained well-shaped craters.

Reaching eventually the basin of the Great Salt Lake, one of the first geological features that struck the travellers was the evidence of the former vast expansion of the Salt Lake. Lines of terrace ran as prominent features along the sides of the mountains, the highest of them standing at a height of nearly 1000 feet above the present level of the lake. Striking into some of the cañons descending from the Wahsatch Mountains into the Salt Lake Basin, Prof. Geikie found the rocks smoothed, polished, and striated by the glaciers that had come down from the heights and had brought with them great quantities of moraine matter. Mounds of rubbish blocked up the valleys here and there, and some of them he observed to descend to the level of the highest terrace. Hence when the Salt Lake extended far beyond its present area, and was about 1000 feet deeper than now, the glaciers from the Wahsatch Mountains reached its edge and shed their bergs over its waters. Bones of the musk-ox had been found in one of the terraces, showing that an arctic fauna lived in this region during these cold ages.

On his return journey the Professor resumed the examination of the surface deposits of these prairies. Coming out of the Colorado Mountains, he noted, in connection with the gravel formerly observed, great quantities of a peculiar grey clay or *loess* inter-stratified with the gravel, and here and there containing a small terrestrial shell (*Succinia vermeta*). It was a freshwater deposit, one that had been swept by the waters coming down from the mountains over the prairie. It might be regarded as marking one of the phases in the period during which the gravel and sand were being thrown down. Tracing the gravel mounds over an extensive tract, he found that they had been deposited irregularly, as might have been the case from the action of water escaping tumultuously and interruptedly from the melting ends of the ice. The water currents would traverse the plain now in one direction, now in another. The whole prairie, for many leagues east from the mountains, must have been flooded with water derived from the melting ends of the great glaciers.

By these successive floods the gravel and sand were spread out irregularly over the plain, and during the same prolonged period of ablation of the ice there were here and there greater streams or periods of more muddy water, when the fine grey loess was diffused over the flats, as has taken place in the valleys of the Danube and Rhine. No doubt some of the fine detritus may be travelling eastward still, for though the rainfall over much of the prairie country is exceedingly slight, it may suffice to give the fine particles of sand and gravel an intermittent movement to lower levels.

NOTES

WE take the following from the *Times*:—The medals awarded and recommended by the Council of the Royal Society for the present year are: The Copley medal to Prof. Rudolph J. E. Clausius, of Bonn, for his well-known researches upon heat; the Davy medal to Mr. P. E. Lecoq de Boisbaudran for his discovery of gallium; a Royal medal to Mr. William Henry Perkin, F.R.S., for his synthetical and other researches in organic chemistry; and a Royal medal to Prof. Andrew Crombie Ramsay, F.R.S., for his long-continued and successful labours in geology and physical geography. These medals will be presented at the anniversary meeting of the Society, on December 1, when Mr. W. Spottiswoode will deliver his first annual address as president.

THE following is the list of office-bearers to be proposed at the annual meeting of the Royal Society of Edinburgh, on November 24:—President, the Right Hon. Lord Moncreiff; Vice-presidents, the Right Rev. Bishop Cotterill, Principal Sir Alexander Grant, Bart., David Milne Home, LL.D., Sir C. Wyville Thomson, LL.D., Prof. Douglas Maclagan, M.D., Prof. H. C. Fleeming Jenkin, F.R.S.; General Secretary, Prof. Tait; Secretaries to Ordinary Meetings, Prof. Turner, Prof. Crum Brown; Treasurer, David Smith; Curator of Library and Museum, Alexander Buchan, M.A.; other Members of Council, Prof. Rutherford, Dr. R. M. Ferguson, Rev. W. Lindsay Alexander, D.D., Dr. Thomas A. G. Balfour, J. Y. Buchanan, Rev. Thomas Brown, Robert Gray, Dr. William Robertson, Prof. Campbell Fraser, Prof. Geikie, Rev. Dr. Casenove, David Stevenson, M. Inst. C.E.

A GRAND diploma of honour has been granted by the Jurymen of the Champs Elysées Exhibition to the Signal Corps of the United States for its magnificent set of maps. No other public institution has sent anything to compete with so formidable an opponent.

ABOUT thirty members of the Academy of Sciences have memorialised M. Jules Ferry, the Minister for Public Instruction, in order to obtain a promotion in the Legion d'Honneur on behalf of M. Henry Giffard, the inventor of the injector and the originator of many interesting experiments in aëronautics. M. Giffard was created a Chevalier about eighteen years ago.

PROFESSORS A. WINNECKE (Strassburg) and G. B. Schiaparelli (Milan) have been nominated correspondents of the physico-mathematical class of the Royal Academy of Sciences of Berlin.

THE magnificent series of scientific collections at Dresden have recently been further enlarged by the addition of an ethnographical and anthropological museum. Many of the objects now exhibited in the lecture-hall of the "Zwinger" had accumulated since the year 1857, and the director, in due recognition of the important position now occupied by ethnography and anthropology in the list of natural sciences, has recently made considerable purchases for the opening of the new museum. The director in question is the well-known New Guinea traveller, Dr. A. B. Meyer, under whose able superintendence the Dresden Zoological Museum is also placed.

WE are glad to receive from Mr. E. W. Lewis his "Lectures on the Geology of Leighton Buzzard and its Neighbourhood," which were given to the Working Men's Club of that town. We should like to see lectures of this kind become more and more common; it is a good method of exciting an interest in science and of encouraging the study of local natural history; it is certainly much better than giving a *rechauffée* of scientific text-books.

AT the meeting of the India Council, last week, a final decision was come to regarding the disposal of the India Museum. The Museum will be taken over, as is proper, by the Lord President, and will be administered by the South Kensington authorities. Important collections in illustration of the Indian building art of antiquity, and of the economic, mineral, vegetable, and animal productions of India will therefore now be from time to time sent to the great centres of the United Kingdom. The botanical part has been intrusted to the authorities at Kew. A grant of 2,000*l*. has been made for the enlargement of the Kew Museum on that account, and a small annual sum will be allowed for contingent expenses and to secure the services of an expert cryptogamist in connection with the collection. In its economic section the India Museum was little more than a very costly duplicate of Kew, which it could never approach in encyclopædic completeness, and it will necessarily be of incalculable benefit to the India Office to keep its economic collections for the future at Kew, where they will be in charge of the first English botanists. In fact, the Indian Secretary will now always have the assurance that the reports on Indian products forwarded by him to the local Governments in India have not only been carefully prepared by his own officers, but are supported by the best scientific advice in this country. The Kew authorities, in continuation of a scheme set on foot by Dr. Forbes Watson, the late Reporter on Products, have undertaken to supply out of their surplus stores samples of Indian articles to any museums in our larger manufacturing and commercial towns which will undertake the cost of suitably exhibiting them to the public. As to the zoological collection, it has always been understood that it would be transferred to the British Museum on the completion by the trustees of their new Natural History Museum at South Kensington. The Buddhistic sculptures will also be taken by the British Museum.

THE *Times* Naples correspondent, writing under date November 8 and 10, states that Vesuvius, which for some time had been capricious in its action, had for a week previously hoisted its red flag. This arises from a small eruptive cone which has sprung up in the centre of the large crater of 1872, and which now rises a few metres above its border. To compare great things with small, the appearance of the summit is that of a small cup in the centre of an immense saucer. The saucer is almost full of lava, which, says the *Osservatorio Vesuviano*, or Prof. Palmieri, has run over the side since October 30, and continues its downward progress on the side of the cone. It is fortunate, says the *Osservatorio*, that on the side on which they are constructing the funicular railway there is a considerable cavity which is not yet filled, so that hopes are entertained that some time will elapse before the lava presents itself in that direction. It may happen, too, adds Palmieri, that an eccentric eruption may occur which will prevent the accumulation of more material. It is thought that a crisis in the history of the mountain is approaching; either there will be a great discharge, such as will terrify the neighbourhood, or, as is more likely, there will be an overflowing of lava, covering the cone with a mantle of fire, and silently inflicting more destruction on property than a grand eruption. Vesuvius has been in an active state now for several years, and Prof. Palmieri has from the first prophesied that the eruption would consist in the overflowing of lava. On the 10th Vesuvius was covered with snow down to its middle, a rare thing so early in the year.

THE juvenile lectures of the Society of Arts will be given this year by Mr. W. H. Preece, on "Wonders of Sound" and "Wonders of Light." The dates for his lectures are December 30 and January 6.

THE French Minister for Commerce has sent to the Academy of Sciences a request to know whether a *diagometer* can be relied upon for ascertaining whether olive oil has been adulterated by common seed oil, and in what proportion. Prof. Palmieri, the director of the Vesuvian Observatory, sent M. Dumas a pamphlet published at the expense of the Chamber of Commerce of Naples nine years ago, showing that the problem had been solved by this apparatus. The principle is the same as the bifilar magnetometer, also invented and designed by Palmieri.

WE have received programmes of the new session of the numerous societies united together under the name of the Cumberland Association for the Advancement of Literature and Science. The programmes of lectures and ordinary meetings are fairly divided between the two fields. The continued prosperity of this provincial association for culture is exceedingly gratifying.

THE Pacific Steam Navigation Company have begun to use the electric light in the illumination of the saloons on board their steamers.

We are glad to be able to acknowledge the receipt of the Report of the Sheffield meeting of the British Association. This early publication is decidedly a mark of progress.

For the first time in its history the Paris Academy of Sciences has regular archives. More than seven hundred cases are filled up with scientific memoirs and documents from the end of the seventeenth century to the present time. Scientific papers left by Réaumur and Ampère are a part of this unexampled collection.

The bequest of the late Mr. John Miers, F.R.S., to the British Museum, consists of his herbarium of South American plants which he made during his long stay in that country; original drawings and the manuscripts of his published works; and some unpublished manuscripts. Among the more important of his unpublished manuscripts is a list of the native names of the plants. The extent of the herbarium is about 20,000 sheets, on which the specimens are carefully mounted, and as it includes the type specimens figured in Mr. Miers's publications, the acquisition to the Museum is of great value. The cases in which the collection was kept form part of the bequest. It was only last year, when nearly ninety, that Mr. Miers published his "Apocynaceæ of South America," with general remarks on the whole family. The work, which was of 277 quarto pages, was illustrated by 35 plates. The "Contributions to Botany," published in three volumes in 1861, 1869, and 1871, were illustrated by 153 plates, and contained 940 quarto pages of letterpress. All the originals of these are included in the collection sent to the British Museum. There are also a large number of other drawings and sketches of dissections.

On October 10 a large balloon fell on a farm in the town of Milwaukee, U.S. The air-ship was picked up and temporarily stored in a warehouse. On the 11th an inspection of the canvas was made, to ascertain whether it was the *Pathfinder*, a balloon in which Prof. Wyse had ascended some days previously in company of a gentleman, and had not been heard of since. It was proved that this balloon had been liberated on Thursday, October 7, at six in the evening, at Waukosha in Wisconsin, and had been wandering in the atmosphere. Before being discovered in Milwaukee, it had been seen coming from Lake Michigan in an opposite direction to where Waukosha lies. The body of Prof. Wyse has not been recovered, but the gentleman who had ascended with him was found drowned and naked. It was supposed he had prepared to escape by swimming, and precipitated himself into the water.

The Manchester Field Naturalists and Archæologists send us an interesting and varied Report for 1877. It contains an account of the numerous excursions made and the papers read at the Society's meetings.

The several stations of meteorology which have been established in several parts of Paris, according to a vote of the Municipal Council, have been in complete operation for a few months. Startling differences have been occasionally discovered between the readings taken by the several observers at a distance of a very few miles.

The *éloge* on M. Thiers was pronounced by M. Henry Martin before the French Institute on November 13. M. Marmier returned thanks in the name of the Académie Française. The lecturer made allusion to the studies of M. Thiers in astronomy under the guidance of M. Leverrier, and in chemistry, of M. St. Claire Deville. It was stated that many experiments were made by the late President of the French Republic in the last years of Napoleon III.'s rule. These experiments were conducted in the laboratory of the École Normal Supérieure, rue d'Ulm.

The additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus radiatus*) from India, presented by Mr. L. H. Ruegg; a Banded Ichneumon (*Herpestes fasciatus*) from West Africa, presented by Mr. H. L. Cocksedge; a Mace's Sea Eagle (*Haliaëtus leucoryphus*) from India, presented by Capt. Butler; a Pomatorhine Skua (*Stercorius pomatorhinus*), British, presented by Mr. F. L. Smith; a Woodcock (*Scolopax rusticola*), British, presented by Mr. J. Pollard; a King Penguin (*Aptenodytes pennanti*) from the Staten Islands, Cape Horn, a Cinereous Vulture (*Vultur monachus*), Europe, a Downy Owl (*Pulsatrix torquata*) from South America, deposited; a Water Rail (*Rallus aquaticus*), British, an Anaconda (*Eunectes murinus*) from South America, purchased.

OUR ASTRONOMICAL COLUMN

The Biela Comet Meteors.—Assuming, as some astronomers will probably be inclined to do, that Biela's comet has now lost the cometary form in which it presented itself to us from 1772 to 1852, and that its constitutuent particles, or whatever we may term them, are drawn out into a stream or band, beyond the circumstance of a great aggregation having been encountered by the earth on the evening of November 27, 1872, we are ignorant of the position of any other centre or centres of condensation that may exist, and even of the real extent of that which has been observed, along the comet's track; and hence it is desirable that a watch for the Biela meteors should be maintained during the whole of the last week in the present month. We are not assuming as a consequence of the disruption of Biela's comet before it was generally observed in 1846, that such is the actual condition of its constituent parts; Mr. Pogson's observations of a cometary body at Madras in December, 1872, require that such an assumption should be taken at present *cum grano*, but under any circumstances observations about the time when the earth approaches nearest to the orbit of the comet this year, will possess great interest, and we hope there may be an effective organisation of observers. In 1852, when the comet was last observed, its period of revolution, in the instantaneous ellipse at perihelion, was 2,417½ days; the effect of planetary perturbation thence tended to increase the period, so that in January, 1866, the latest time to which the calculations have been carried, the revolution extended to 2,445 days, according to Michez and Clausen. If this were about the period of the meteoric mass which the earth encountered on November 27, 1872, it is very doubtful if we shall be in proximity to it again during the present century; nevertheless, as above remarked, we do not know its extent along the orbit, and other aggregations may exist. A body moving in the orbit of Biela, and approaching the earth at this date, would be at a distance of about 1·4 from the planet Jupiter in September, 1878, and there might be very sensible effect upon the period of revolution.

A New Nebula.—Dr. Tempel states that on September 19 he found a new nebula which, from his description, appears to be nearly as bright as an average second-class of Sir W. Herschel, and is therefore deserving of attention on the score of possible variability, since in these days we hardly expect to meet with many unknown second-class nebulæ visible in European latitudes. Dr. Tempel mentions that there is a central glimmer as from very minute stars: it is about one minute in diameter, and its position for the beginning of the present year is in R.A. 22h. 41m. 25s., N.P.D. 102° 27′·1: it is very little fainter than the nebula II. 744. He adds that he has often sought for the nebula No. 49 of Auwers, which should be near the new one, but has only found in its assigned position a star of 12m., which has a very faint companion. Auwers 49 is the object observed as a star 11·5m. on October 8, 1855, in one of the Markree zones, and called "nebulous;" position for 1850 in R.A. 22h. 52m. 35s., N.P.D. 101° 19′·9. The late Mr. Edward Cooper had so unfavourable an opinion of the climate in his locality for astronomical purposes (perhaps from long experience of the skies of Italy), that probably he would not have been surprised at the discovery of any number of "nebulous" objects at Markree; but the four volumes of positions of small stars for which astronomers are indebted to him, sufficiently illustrate the good work that may be effected by well-directed energy and skilful arrangement, even in such a climate as we remember to have heard him describe that of Sligo. Pons expressed his fear that